Contrasting Political and Techno-economic Perspectives on Energy Development in Bangladesh

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Abstract

This paper assesses whether selected power sector policies in Bangladesh may have been subject to excessive political interference in contrast to rational and open decision-making approach. This is done by comparing techno-economic assessments with populist narratives on the merits and demerits of three specific policies. While the populist narrative is critical of all three policies, techno-economic assessments are less conclusive and some aspects are explained by the context in which the policy planning has occurred. The paper reflects on the differences between populist narrative and techno-economic assessment and suggests how an awareness of their differences may inform future planning.

Keywords: Power sector policies, Populist narrative; Techno-economic; Quick Rental Power Plants; Policy-making; Rampal Power Plant, Bangladesh

Introduction

This paper explores whether selected power sector policies in Bangladesh may have been subject to party/political interest rather than rational and open decision-making approach. Bangladesh offers an interesting case study. In contemporary literature, Bangladesh has been cautiously labelled as a 'success story' (Gardner, 2012; Lewis, 2011; Van Schendel, 2009) and recently achieved lower Middle-Income Country status. Once described as a *basket case for development*, against many odds, Bangladesh now features frequently in global economic forecasts with a GDP of almost $221 billion

(2016). Bangladesh's GDP growth is 7.1% (2016) and GDP per capita is $1359 ($3319 PPP), according to the World Bank (2017). Business Monitor International (BMI, 2016) identifies the country as one of the ten emerging markets for the future of the global economy. Bangladesh's development successes are attributed to the country's progressive government (Hashemi, 1995), vibrant civil society (Kamruzzaman, 2014; Devine, 2006), sizeable donor community (Wood, 1994; Lewis, 2011; 1993, Khan, 2013) and an active business community (Werner, 2009; Belal, 2008). However, Bangladesh's recent success is underpinned by a paradox in which strong economic performance and improved social indicators co-exist with what has been described as a dysfunctional political system and predatory bureaucracy (Devine, 2009; Lewis, 2011). This has a significant bearing on Bangladesh's policy architecture. As Rashid (2014) insists, the role of the bureaucracy in policymaking is undermined by excessive political influence. This could be due to a decline in bureaucratic capacities but bureaucrats often lose objectivity in policymaking as undue political inference and partisan interests (as an outcome of incentives created by patronage politics) override neutral expertise (Aminuzzaman; 2013; Rashid, 2014).

There is a wider consensus that Bangladesh's socio-economic progress is dependent on its ability to generate power and make best use of other natural resources. For example, a vibrant ready-made garment sector that generates significant income from international trade, and self-sufficiency in food production are often mentioned as indicators of Bangladesh's recent success. Both these sectors heavily rely on reliable power supply. To continue its progress in various aspects of socio-economic as well as human development, Bangladesh thus needs to ensure that the supply of electricity is consistent with its fast growing demands (Uddin and Taplin, 2008). This sets the background for this paper to critically examine power sector policies to understand

whether these policies were based upon nationally appropriate reasoned evidence or other interests. Three specific policies are considered in depth: Quick Rental Power Plants (QRPPs), Rampal Power Plant (RPP), and the planned increase in the proportion of electricity to be generated by coal-fired power plants. Generally speaking, policymaking is not a mere technical matter, but the rational and open approach of policy making also takes socio-political contexts into account. For the selected policies discussed in this paper, these issues (technical, economic, political) are examined in turn, presenting the policy from a technical and economic (henceforth techno-economic) perspective and then presenting the populist narratives that outlines the political perspectives in more detail. In contrasting and complementing techno-economic and political narratives, energy policies in Bangladesh can be viewed through a more holistic lens in evaluating whether the selected policies of Bangladesh are made based on technical reasons, or other broader political interests or the combination of both.

The structure of the paper is as follows: the next section provides a conceptual framework outlining how political interests may influence policymaking followed by a brief methodological note clarifying how the techno-economic reflections and populist narratives were developed. This is followed by a section in which both techno-economic perspectives and populist narratives are presented in turn in a discursive format (i.e. without necessarily agreeing fully with the alternative viewpoint) for the selected polices, before contrasting them in the analysis section. Finally, a concluding section draws these insights together and offers some recommendations in the hope that these would add to the debate on whether i) policy problems are solely a technical matter, or ii) a combined approach that incorporates bespoke socio-political context as well as reasoned technical and economic arguments is necessary in order to find suitable policy options in a local context.

Conceptual Framework

In analysing a particular policy, it is imperative to perceive whether policymakers can act independently and objectively. To illustrate, it is important to understand i) whether policymakers can identify a problem without any bias (such as interest of a class/social groups, region), and ii) the intention of the state (whether the state intends to expand its power and wealth, or it wishes to enhance material benefits for particular groups (e.g. elites, political parties/factions etc.) and non-material values) (Haas, 1992). Policies and their formulations are not a static or mechanical task. Policymaking and policy choices are closely tied to available resources and power relations of several actors involved in the process (Clarke, 2002; Gastelum Lage, 2012). Rather than the logical outcomes of rational selection procedures of best policy alternatives, policies are often formulated and implemented in particular social and historical contexts. These contexts matter in understanding why particular issues are put on the policy agenda, and why specific policies are developed (Mooij, 2007). While this might be applicable more widely, socio-political and historical contexts might also include the agenda of the donors and other political patrons, especially in developing countries. Policymaking, mainly in Western countries, can be focused on state-centred approaches (where policymakers and their interests determine the goals and content of public policies) and society-centred approaches (where interest groups or class based organisations mobilise to influence public policy), (see Grindle and Thomas; 1989, Sutton, 1999; and Keeley and Scoones, 1999 for a detailed discussion about these approaches). The processes of policymaking, in recent years, have broadened beyond the state and engagements from civil society groups and non-governmental organisations are heralded as useful good practice (Lewis, 2018). However, in many developing countries, policymaking process and capacity for effective policymaking are not the same as in Western countries (Conteh

and Ohemeng, 2009), and Bangladesh is no different (see above). Alongside the actors included in state-centred and society-centred approaches (such as bureaucrats, politicians, community groups, everyday citizens and various networks among these actors) "epistemic communities play a role in articulating the cause-and-effect relationships of complex problems, helping states identify their interests, framing the issues for collective debate, proposing specific policies, and identifying salient points for negotiation" (Haas 1992:2). Incorporating views from diverse actors through reasoned arguments and in a transparent manner thought to represent openness in policy-making. While it can be argued that openness is an integral component of contemporary policymaking, Vigar and Healey (2002) insist that openness has become instrumental in environmentally respectful planning. Wolsink (2007) asserts that open and environmentally respectful policies offer a new dimension in contrast to technocratic and corporatist styles of policymaking carried out by economic, scientific and political elites. The conventional technocratic approach to policymaking involving state, bureaucrats, and policy elites often benefits capitalists. Here the governments need the capitalists and capitalists need the government. To illustrate, capitalists often need the government to adopt policies that will provide them with physical infrastructure, access to low cost capital and help obtaining access to scarce land or natural resources (Whitfield and Burr, 2014). Whereas, other scholars (such as Lewis, 2018; Mosse and Lewis, 2006) argue to break this conventional cycle and humanise policy processes through more participatory and ethnographic methods (Lewis, 2018 identifies this as 'methodological populism') in order to supplement formal technicalities with people's experiences and different narratives. It is argued in this paper that the aspects of environmentally respectful planning and the call for humanising policy processes are closely linked with power sector policymaking in

Bangladesh. As with its economic progress, rapid urbanisation and massive population Bangladesh now faces a number of environmental challenges (such as sea level rise due to climate change, industrial waste, river pollution, power and energy crises and cognate challenges in increasing power generating capacity). In the first instance, many of these challenges may appear technical but, along with the policy implications, they are also inherently political.

Methodology

Before presenting discursive accounts of techno-economic perspectives and populist narratives for selected power sector policies in Bangladesh, this section describes how these perspectives were developed.

Populist narratives in this paper are based on secondary sources of analysis. Instead of directly observing, or interviewing, or asking someone to fill in a questionnaire for the purposes of research inquiry, secondary sources of analysis deals with something produced for other purposes. This is an example of indirect observation, as the research subject is not affected (Robson, 1993). Evidence from academic sources as well as articles published in related topic in national (Bangladesh) newspaper, international media and other online platforms were used. Although academic sources carry wider credibility, newspapers and contents from other digital platforms (such as reports from research organisations, think-tanks, and NGOs) are also important research resources for academics across the humanities and social sciences as valid sources of information in their own right, and can act as a litmus of broader social, political and cultural trends (Deacon, 2007). The broad scope and consistency of their coverage, as well as their wider availability, makes these sources especially attractive as credible source(s) of data (Oliver, Cadena-Roa and Strawn, 2004). Relevant articles (N=162) and columns from

Bangladeshi newspapers such as *The Daily Star* (English) and *The Prothom-Alo* (Bengali) were used in order to follow the emerging narratives regarding the selected polices in Bangladesh. Additionally, related word search on Google and the library of the University of Bath, UK were employed. Items (e.g. journal articles, newspapers, book chapters, blogs, research reports) were carefully selected to reflect those are closely related to the policies being analysed. In developing the populist narratives presented in this paper, these arguments and evidence were summarised before being combined and contrasted based upon qualitative content analysis.

The techno-economic reflections were based upon a two-stage process. Firstly, literature was gathered regarding the techno-economics and background to the three policies. The analyses in the collated literature were then critically assessed and compared to the assertions presented in the populist narratives.

In some cases, the relevant literature took an appropriately national perspective to its analysis and so comparison to international norms (e.g. by converting local prices and comparing to regional and global averages) was instructive. In some cases it was necessary to compare the context (operational and in terms of assumptions about the future) in which the techno-economic assessments were performed to the context in which the assertions proposed by the populist narrative were developed. For example, system development may not have occurred as planned or planning may have been updated to address previous uncertainties or perceived weaknesses. Here, additional quantitative analysis was used to reassess the conclusions of reports in the light of updated context that is now available. Specifically, price projections for different fuels (such as natural gas, coal, and liquid natural gas) were converted to comparable units

and adjusted according to relative efficiency of their respective generation plants in order to provide a clear comparison between them. Similarly, information about the Greenhouse Gas (GHG) emissions of each generation type (per unit of electricity generated – the "carbon intensity") was used alongside the proposed generation mixes in order to determine the potential difficulty of achieving Bangladesh's commitments under the Paris agreement. In some cases, it was instructive to expand upon specific technical requirements of the power system that are potentially missing from the populist narratives. At the same time, the collated techno-economic literature was examined critically and omissions or inconsistencies noted before assessing whether they bear on the comparison being undertaken. This included searching for concerns that are identified but not fully or adequately addressed by the techno-economic literature.

Techno-economic Analysis and Populist Narratives on the selected Policies

This section provides discursive accounts of techno-economic analysis and populist narratives on selected power sector policies in Bangladesh. Below, these policies are discussed in turn with the populist narratives following techno-economic perspectives.

Policy-1 - Quick Rental Power Plants

Background

Bangladesh has long been suffering from power generation shortages – for example, around 800MW (compared to peak demand of over 9000MW) as recently as 2015 (Rahman n.d.). The government of Bangladesh has employed "quick rental power plants" (QRPP) to partially mitigate this shortfall, along with an increasing share of

other rental plants more recently (see Table 1).

- TABLE 1 ABOUT HERE -

The QRPPs are privately owned and typically liquid-fuel fired, in contrast to the predominantly publicly owned gas-fired plant that has characterised the power generation sector so far. The Government of Bangladesh (GoB) claimed that no option was available other than installation of liquid fuel based rental power plants in the shortest time available. Under the short term plan, oil based power generation contributed about 1300 MW out of total initial rental power plant capacity of about 1700 MW. The narrative of the GoB to justify this was that due to the persistent gas crisis and uncertain prospects of domestic gas sector development, a strategic decision to diversify primary fuel supply was critical for the sustainable development of the power sector.

However, the higher price (per unit of electricity) and emissions associated with QRPPs has received criticism and led to conclusions that their selection was largely influenced by political cronyism or similar corrupt practices.

Reflections on Narrative from Techno-economic Perspective

The price (per unit of electricity) and emissions associated with QRPPs are relatively high. However, there are several reasons that their use could be considered part of a coherent plan.

Bangladesh has long suffered from power shortages that have caused problems for domestic users and also an economic penalty (estimated at around 0.5% of GDP – Gomes, 2013). So addressing this shortfall is a valid aim. Within the 2010 Power System Master Plan (PSMP), the QRPPs were seen as a short-term option, with more

efficient plant coming online and replacing these rental plants where possible. This development takes some time but while there has been a significant increase in other generation capacity, this has been slower than planned for and so supplementary generation (through rental power plants) still helps to minimise shortages. There are additional factors such as a lack of availability of natural gas and transmission constraints that also contribute to power shortages (Rahman, n.d.). It appears that many of the QRPPs and other rental power plants have been located to provide grid support (i.e. alleviating the transmission constraints) as well as reducing shortages more generally (e.g. see BPDB, 2015), but more detailed temporal and geographic analysis of loads would be needed to confirm their efficacy.

Electricity prices in Bangladesh have historically been low, partially due to direct public subsidies and effective subsidies in the price of natural gas. This has tended to emphasise the high price of the QRPPs electricity generation, which although high, is not so high compared to unsubsidised electricity.

The QRPPs tend to have greater use during peak demands – that is, their capacity factor is typically quite low relative to other generating plant. Figure 1 provides a stylised profile of the different generation types used throughout the day (based on the grid in Bangladesh at the end of 2016 - BPDB 2017b). In this illustrative example, the peak generation from oil fired plants is half that from gas fired plants (2100MW cf. 4200MW). However, generation from oil-fired plants is less even and so the total generation from oil fired plants is less than one quarter of that from gas fired plants (20GWh cf. 89GWh). This contributes to a higher per unit price being demanded for electricity from the oil-fired plants, but it should be noted that their share of total costs (and environmental impacts) will be somewhat lower than a simple comparison of generating capacity might imply.

- FIGURE 1 ABOUT HERE -

The selection of QRPPs and the allocation of their contracts may have suffered from the inappropriate political influence proposed by populist narratives (see below) but the prices associated with these units and their characteristics do not, alone, conclusively show this.

Populist Narratives on Quick Rental Power Plants

For Ali, Faruk and Das Gupta (2012) dependency on fuel for the QRPPs is very dangerous for Bangladesh. Instead of improving the power shortage, according to them, QRPPs have worsened the situation because the supply of oil is not always possible. The QRPPs were supposed to be temporary, quick and advantageous for the Government. But critics claim that this has been a harmful step for the country as the Government have kept the rental power plants despite the big difference between subscriber's fee and government spending in this venture.

It is argued that the Government is facing an economic crisis to meet the expenses of providing fuel to the QRPPs (and other rental power plants). It is believed that the GoB has already fallen into a 'subsidy trap' to run furnace oil-fired and high-cost diesel power plants and is left with no option other than spending a substantial amount from country's financial reserve (for importing additional diesel and furnace oil). For example, it is estimated that the government had to pay around Tk. 90 billion in subsidy to the state-owned power body the Bangladesh Power Development Board (BPDB) in the fiscal year (FY) 2011-12 for purchasing electricity mainly from high cost diesel and furnace oil-based RPPs and QRPPs. The amount of subsidy required for the 2012-13 FY was double than previous year's cost; equivalent of one-third of total revenue (Sultana 2016, Ali, Faruk and Das Gupta 2012). There has been another spin-off, to

minimise the impact of financial loss on account of power generation, the Government has also increased fuel price and taken further initiatives to increase power tariffs (Financial Express, Bangladesh 2011).

This is where the aspect of political consideration and influence is significant, as described in the populist narratives. There are allegations of corruption about the QRPPs. Critics insist that favourable deals were struck for the political cronies regarding QRPPs and that the Government is forced to pay huge amount of money in subsidies to the owners of these plants (Islam, 2016). Moreover, the government has incorporated an 'indemnity' clause in the Expeditious and Enhanced supply of Power and Energy (special provision) Act 2010. The Act stops any legal action against the government official(s) concerned in the matters of allowing [quick] rental power plants and other irregularities, if there are any (Sultana 2016) – adding further suspicions to the popular criticisms of corruption in the setting-up and running of the QRPPs.

Policy-2 - Rampal Power Plant

Background

A relatively large (1.3GW) coal fired power plant is planned for construction in Rampal (Bagerhat, Bangladesh). This location is near to a globally significant mangrove forest (the Sundarbans) and has attracted significant public opposition. It is suggested that the location and type of plant have been selected on the basis of political allegiance to India and the inappropriate intervention of coal supplying interests.

Reflections on Narrative from Techno-economic Perspective

Impacts associated with the Rampal Power Plant (RPP) scheme can be considered in terms of those that would occur regardless of the location of the power plant and those

that are specific to the location. In general, the development of coal-fired power plants such as RPP is consistent with the Power Sector Master Plan (BPDP 2010), (albeit that it is significantly larger than the initial tier of 600MW plants that were proposed). However, the location-specific impacts associated with RPP are more problematic.

The official Environmental Impact Assessment for the plant (CEGIS, 2013) attempts to address some concerns relating to the location but it has been subject to considerable criticism from experts relating to ambiguities and issues that are not adequately addressed (ibid. especially volume III, covering comments and responses). The assessment (ibid.) does outline some advantages for the Rampal site over an alternative in Khulna area but does not provide meaningful discussion of other options further afield. Rampal is situated such that power transmission to Khulna (3rd largest city, population around 700,000) is relatively short but given that higher capacity transmission towards Dhaka (the capital) is also likely to be required (Rahman, n.d.), it seems unlikely that this advantage rules out other locations.

Some risks are poorly represented by simplified analysis (Stirling, 2010). It is likely that this applies to some of the concerns relating to RPP, given the uncertainty/disagreement relating to the significant hazards they might present. In particular, the potential for ecological damage has been noted as a cause for significant concern by UNESCO given the unique status of the Sundarban region (Doak et. al., 2016). Concern has also been raised over the vulnerability of the proposed location to hazards such as cyclones (Sharda and Buckley, 2016).

It is possible that inappropriate influences have resulted in this location being selected but without further information, it is also not obvious why this hypothetical influence would favour the Rampal location over one that would (presumably) not have been so

controversial or unpopular with the general public or internationally.

Populist Narrative on Rampal Power Plant

The RPP project has generated significant criticism from the public and civil society urging the government to relocate this power plant (similar to the call of the UNESCO and other international organisations). Nationally and internationally, there have been large protests against this project. Civil society organisations, activists and others protesters (including in the social media) opposing this project assert that government has acted stubbornly because of political reasons with neighbouring India[1], despite knowing that the RPP will have cataclysmic effect on the Sundarbans and its bio-diversity. To elaborate, the RPP is a partnership between the Bangladesh Power Development Board and India's state-owned National Thermal Power Corporation (NTPC), which will share ownership of the plant, as well as the electricity it would produce. The GoB insists that the Plant "will suck up 9,150 cubic meters of water from the Poshur River every hour and run it through a desalination plant. However, since mangroves depend on a brackish mix of fresh and salt water, scientists and critics not only fear that water levels in the Poshur river will run low, but also that the blend of fresh-and-salt water could be disrupted, dooming swaths of the Sunderban's mangroves" (cited in Hance 2013). Hance (2013) also observes that "water dumped

1 This is visible from the following: "coal is big business in India, and no doubt there are powerful interests at play," says Ashish Fernandes, an expert on coal with Greenpeace India. "If Bangladesh is locked into a coal-dependent energy paradigm, companies like NTPC will make significant profits, at the cost of [Bangladesh's] people and environment" [cited in Hance, 2013]

back into Poshur River will be up 20 to 25 degrees F warmer than the river water, threatening aquatic species". Leading international environmental organisations have raised similar concerns. For example, in 2016, the World Heritage Centre and International Union for the Conservation of Nature (IUCN) conducted a monitoring mission to review potential impacts from the construction of the RPP "assessing risks from climate change, and evaluating the overall management system of the Sundarbans, including provisions around shipping safety[2]. The mission visited the proposed site as well as the locations of a cargo vessel accident in 2015, and, [the location of a] oil spill" in 2016. The mission convened meetings with key ministries, industry representatives, port authorities, researchers and local community members. The report concludes that "the proposed Rampal Power Plant poses a serious threat to the Sundarbans". The IUCN report (Doak et. al. 2016: 3) also identifies four key concerns: "pollution from coal ash by air, pollution from wastewater and waste ash, increased shipping and dredging, and the cumulative impact of industrial and related development infrastructure".

While the critics, civil society organisations and international organisations such as UNESCO and IUCN are persistently voicing their concerns about the damaging impact of the Rampal project, the GoB (including Ministers, and Advisers to the Prime Minister) insist that the most advanced technologies will be used to mitigate possible risks for Sundarbans and therefore there is no scope to retreat from this project

2 On 18 October 2016, the World Heritage Centre and IUCN call for relocation of Rampal power plant, citing this as a serious threat to the Sundarbans (see http://whc.unesco.org/en/news/1573). More information provided by Doak et. al. (2013)

(Prothom-Alo 2016a). To illustrate, Tawfiq-e-Elahi Chowdhury, an adviser to the Prime Minister in an interview explains that "the Rampal Power Plant would be built using the latest ultra super critical technology, so it would not affect the environment of Sundarbans" (cited in Hance 2013). Such claims have been rejected by civil society organisations and commentators such as Uddin (2016) who insists that supercritical technology is outdated and has "been superseded by the more modern and efficient 'ultra-supercritical' (USC) technology". He goes on to explain that, "contrary to the claims of the Bangladeshi government, the Rampal Power Plant is bound to produce high levels of carbon dioxide and waste-water discharges. It is also likely that Rampal will in fact be run using poor quality coal imported from India, which spits out lots of ash without creating much energy" (ibid). Moreover, reports by NGO network Banktracks (2015), and Sharda and Buckley (2016) claim the RPP project takes no account of the potential for industrial accidents, transportation incidents, tidal waves and other natural disasters in the region. Further concerns were raised by Human Rights organisations about the displacement of families and the occupation of land in adjacent areas. For example, a report from the South Asians for Human Rights (2015) show that fishermen, woodcutters and honey collectors have already lost their livelihoods as a result of displacement and encroachments onto their lands.

At this stage one might also raise the question how these narratives are viewed by the people of India (who also share parts of the Sundarbans) and more broadly by the international community. There have been protests against the RPP project internationally including by the people of India (The Daily Star, 2016). International organisations such as UNESCO, Greenpeace, and IUCN are also highly concerned (Rahman, 2017; The Daily Star 2017). At the time of writing this paper, Norway's

sovereign wealth fund has taken out Indian industrial giant Bharat Heavy Electricals Ltd (Bhel) that was awarded the contract to build the RPP, from its investment portfolio due to environmental concerns. Moreover, there seems to be no rationale or credible plans on transporting coal for this large project. This suggests that risks for accidents will be high especially after a few major accidents in recent times (including sinking of several oil vessels close to the Sundarbans). Not only this, the GoB is violating its own law by permitting 190 industries (notably, manufacturing plants for cement, LPG gas and gas cylinder, oil refinery, brick-kilns, saline water refinery and welding factory) within the Ecologically Critical Area (ECA) of the Sundarbans[3]. Critics argue that these are the satellite industries of the RPP project and possess serious threat to the bio-diversity of the Sundarbans (Daily Star, 2018; Prothom Alo, 2018).

Given this context, Anu Muhammad, a Professor of Economics, and the Member Secretary of the Committee for Protecting National Fuel and Gas, insists that the government is not driven by scientific evidence, logic, public interest, and its

[3] The GoB declared the 10-kilometre periphery of the Sundarbans as the ECA in 1999, a couple of years after the Unesco listed it as a natural world heritage site. As per Bangladesh Environment Conservation Act 1995 (amended in 2010), no one is allowed to set up any factory in the ECA. According to a report published in the Daily Star (2018), out of the 190 industries, 181 have already obtained the environment clearance certificate and the other nine the site clearance certificate from the Department of Environment (DoE) over the last several years. The report also insists that at least 24 of the industries fall under the 'red category', meaning those are extremely harmful to the fragile biodiversity of the Sundarbans.

responsibilities for environmental challenges. He strongly argues that policies should be made based on evidence and reasoned arguments, yet that no evidence is being presented by the Government or the NTPC as to how the challenges, raised in national and international studies, will be mitigated (Anu 2016). He also claims that apart from a handful of politicians and 'experts' who will directly benefit from the RPP project most people are against this project (Prothom Alo 2017).

Policy- 3 - Gas or Coal Emphasis in Electricity Generation Planning

Background

Electricity generation in Bangladesh has been predominantly gas fired, taking advantage of Bangladesh's reserves of natural gas. However, the 2010 Power System Master Plan (PSMP) outlines the intention to transition to a generation mix in which coal fired plants generate around 50% of electricity (with gas generation forming 25%) by 2030 (BPDB, 2010).

Reflections on Narrative from Techno-economic Perspective

The 2010 PSMP was updated in 2016 (BPDB, 2016). Both plans use an "Economic, Environmental and Energy security" (EEE) assessment approach and aim to provide a vision for the Bangladesh power sector with a holistic perspective. The 2016 plan presents a clearer approach to weighting the assessment criteria and, along with other updated information, recommended an electricity mix with 35% gas-fired generation and 35% coal-fired generation. The report notes sensitivity in its findings to future changes in the price of renewables and suggests that this role can be reviewed at appropriate intervals.

Some criticism of the prominence of coal-fired generation in the PSMPs relates to its

perceived higher costs; in contrast this is presented as a factor favouring the use of coal in both PSMPs. This apparent contradiction may be partially explained by noting that the main fuel used to generate electricity is domestically sourced natural gas that is presently supplied to the power sector at a subsidised price, well below international averages. However, at the current rate of extraction, known reserves are estimated at around 9-14 years (Rahman, n.d.). Furthermore, current gas supplies were estimated to be only two-thirds of total (met plus unmet) demand in 2011 (Gomes, 2013) and so for the role of gas to continue (and expand), supply will need to increase - potentially through a combination of offshore development and imports. The PSMPs assume that some transition towards imported liquid natural gas (LNG) will be required and that will significantly increase the costs. For example, the average end-user price for gas is currently 1.88 $/mm-btu, contrasting with LNG prices proposed for Pakistan (in 2013) of 17.7 $/mm-btu (OEIS, 2013).

In fact, the price of LNG has dropped significantly since the preparation of the 2016 PSMP (see Figure 2 - based on World Bank, 2017a[4]). This was not anticipated at the time of developing the PSMP and so it is understandable that the economic analysis underpinning part of the plan highly favoured coal. It should also be noted that LNG has historically exhibited higher price volatility than coal and this is likely to continue. However, with the carbon price adopted by the 2016 PSMP ($125/ton-CO2), using the new set of price projections from the World Bank would probably have led to the recommendation of a greater role for LNG under the methodology that was adopted.

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4 Converted to price per kWh-electricity, based on nominal efficiencies of 45% for coal and 60% for CCGT.

For Bangladesh to achieve its commitments under the Paris climate agreement relating to its power sector[5], would be very challenging under the coal based mix advocated in the 2010 PSMP. However, it would be achievable (albeit still with challenges) within the range of cleaner options suggested in the 2016 PSMP. This target could be relatively straightforward with a grid generation mix that is even more similar to the present day.

- FIGURE 2 ABOUT HERE -

Although it is clear that a reassessment of the proposed planning is appropriate, the conclusions made at the time could be justified by the criteria and information they were made under and so a techno-economic analysis on its own is unlikely to provide strong evidence of any inappropriate influence on the decision making relating to this.

Populist Narrative on Gas or Coal in Power Generation in Bangladesh

Despite growing demand for power and natural resources to generate more power, there are no visible improvement in increasing domestic capacity through new exploratory excavations or enhancing the capability of state-owned organisations such as Bangladesh Petroleum Exploration and Production Company Limited (BAPEX) and Bangladesh Oil, Gas and Mineral Corporation (shortly named as Petro-Bangla). There are also little attempts to explore new gas field since the find in Rupgonj in 2014. A similar picture can also be found in terms of exploring gas fields in the Bay of Bengal or

5 Around 91MtCO2e from 190GWh reducing to around 75MtCO2e (assuming growth projections hold)
http://www4.unfccc.int/ndcregistry/PublishedDocuments/Bangladesh%20First/INDC_2015_of_Bangladesh.pdf

exploring new coalmines within the country. One reason for this is the significant differences of opinion regarding which foreign company should get permission from the government to conduct further exploration along with BAPEX (Prothom-Alo 2016b). While new coal based plants are under construction (e.g. Rampal), the country is becoming increasingly dependent on importing coal from other countries. Imam (2016) fears that by 2030, with the current trend, Bangladesh will have to import 90% of its coal. This will eventually require massive GoB funding and subsidies. He insists that, exploring less than ten gas fields in last ten years demonstrates gross negligence from the government and policymakers (ibid).

While techno-economic analysis cannot conclusively support the allegation of political influence (see above), the populist narratives tend to suggest that the coal-based plants are favoured in the 2016 PSMP because this offers more opportunity for corruption. Powerful countries which are political allies of the GoB, and multi-national companies are trying to make money in Bangladesh. To do so, they are bribing the local politicians, policymakers and bureaucrats. Moreover, within the populist narrative, coal in power generation has been identified as a dangerous and hazardous option. To illustrate, for Huq (2017), coal has been the most polluting fossil fuel for generating power in large power plants. He insists that, in Bangladesh, coal does not offer a clean or suitable option, and the future of coal based power generation should come to an end as relying on an obsolete technology such as coal will not be in the best interest of Bangladesh.

Nevertheless, there are also arguments within the populist narrative claiming that coal in Bangladesh's five discovered coalfields is of very high quality, albeit with intense debate on whether, and how, this coal should be exploited. Rahman (2012), and Sajjad and Rasul (2015) describe some of the characteristics of the coal reserve region of Bangladesh and relevant issues of coal mining in the country. First, the locations of the

coalmines are densely populated, as is Bangladesh. Coal exploitation would require massive resettlement plans, a thorny as well as costly issue in land-scarce Bangladesh. Second, a thick layer (100m–200m) of soft, waterlogged sand lying over the coal reserves is "likely to create significant problems for exploitation of coal resources, whether mined by the open-pit or closed-pit method. In case of underground mining, this water layer would make the exploration process both complex and costly, with a high likelihood of flood and accidents during mining activities. In the case of open mining, there would be a need to pump out huge amounts of water, which could create environmental problems. Indeed, hydrological management will be a major challenge in both cases" (Rahman, 2012: 11). Third, the soil over the coal-reserve areas in Bangladesh is extremely fertile. Farmers use these lands for two or three crops a year, meaning that these locations provide a permanent livelihood to the farming communities, which could be irreversibly lost if over-ground, open-pit mining method is chosen. "These features, which are noted in the draft Coal Policy (2008) report, make coal mining in Bangladesh particularly problematic. The major policy debate in Bangladesh is on the one hand about the concerns options and modalities to explore its coal resources and on the other hand, the current and future energy needs and Bangladesh's desire to ensure energy-security" (Rahman, 2012: 12). These issues represent an obvious policy dilemma. Particularly as in the GoB plan, the power generation capacity will reach about 40,000 MW by 2030, half of which would be produced in coal-based power plants. The amount of "coal required to produce 20,000 MW of electricity would be 60 million tonnes per year. Most of the required coal will be imported from coal exporting countries like Australia, Indonesia or South Africa" (Imam, 2017). To what extent this will be a sustainable method poses a major policy concern in Bangladesh's power sector policies despite the debate on which method

Bangladesh should adopt in order to utilise its coalmines. Moreover, Bangladesh having no experience for large-scale coal import has now chosen to develop coal fired power plants, based on imported coal. Unfortunately, the required volume of coal import (for the projected 9,000 MW power generation based on coal) "will not be possible without deep-sea port facilities and inland water route development. RPP itself will require 4.72 million tonnes of coal import and supply to the power plant annually that has emerged as a major challenge for BPDB" (ibid). Therefore, coal fired power generation targets with imported coal may be a tricky choice and certainly not a popular one. It is argued by the critics that if future power plant constructions are not synchronized with fuel supply arrangements this will only create uncertainties in power generation. As Rahman (2014) argues, "the existing practices of haphazard developments will [further] increase cost of the energy and power project development that will ultimately trickle down to the common people."

Analysis

Among the three policies considered here, different relationships can be observed between the techno-economic reflections and the populist narrative. In the case of the Quick Rental Power Plants (QRPPs), their conclusions differ. However, in the case of the Rampal Power Plant (RPP), they are quite well aligned. The overall planning of the electricity system is somewhat more complex and both perspectives highlight factors not really addressed by the other.

The two perspectives differ somewhat in their conclusions regarding Quick Rental Power Plants (QRPPs). From a techno-economic point of view, the QRPPs appear to be a reasonable solution in the absence of viable alternatives and so while malpractice cannot be ruled out, it certainly is not an obvious conclusion. However, from the

populist viewpoint, the continued use of QRPPs is considered proof of Governmental problems. In reality, both perspectives probably miss certain aspects of this issue. There is a political context that is not captured by technical analysis and may provide a different light on findings. The GoB's inclusion of an 'indemnity' clause in the Expeditious and Enhanced supply of Power and Energy (special provision) Act 2010, in order to prevent any legal action against the government officials concerned in allowing or approving QRPPs might be interpreted as an indicator of corruption or wrongdoing. Conversely, the populist view is partially based on an underestimate of the technical and economic challenges associated with alternative solutions and subsidies given to power generation from gas. While severe power shortages are commonplace in Bangladesh and alternative mechanisms of power-generation are still under development, the popular narratives do not consider what alternatives might be viable.

By contrast, in the case of RPP both perspectives identify that there are significant concerns regarding the proposed location. On one hand, while it is not possible to draw conclusions about the underlying motives for the location of RPP from the technical information presented, it also nevertheless hard to justify this choice. On the other hand, the populist perspective can go further to speculate on this and take account of additional contextual factors. Many of the concerns expressed in the populist narrative seem to reflect a lack of confidence in the GoB's commitment to mitigation measures, rather than (or possibly in addition to) a lack of satisfaction with the technical details of these measures. For example, the populist view is that measures such as covering the coal, using cleaner coal, moving the fly ash and adopting a strict policy in transporting coal to avoid major accidents will not actually be adhered to. It is also possible that a lack of negotiation and openness in policymaking causes some concern. While both sides claim that their arguments are based on scientific evidence they are not discussing

nor resolving the points of disagreements. The GoB's disregard of public protests as well as concerns from national and international organisations raises further concern regarding the Government's determination to press ahead with the project without further consultations. Within the populist narrative, this is taken as evidence of a stubborn or dictatorial attitude while public policies should be open based on evidence and reasoned arguments taking public opinions and local contexts into account (see conceptual framework section).

Finally, comparison between the perspectives regarding the future electrical grid generation mix is more involved. As a complex issue, it is reasonable to hope that both perspectives would present pictures that include a spectrum of positive and negative elements. From a technical point of view, the planning appears self-consistent and the suggested course of action is justified by the analysis that was completed to support it. Some aspects of the analysis could be explained more transparently but it is not clear how significant these elements are. Other aspects are outdated (due to developments in international energy markets) and it would be appropriate to revisit these. If there is excessive reluctance to review the planning in light of changing circumstances (notably, the changes in the price of LNG and renewables), that could be interpreted as an indicator that either the Government suffers from policy myopia or the allegations of material benefit as well as political patronage and inappropriate interest are legitimate. However, this should be balanced against the need to press ahead with developments – the lack of which also appears to be the source of some of the discontent expressed within the populist narrative. The related aspects of policy for coal and lack of exploration for new gas blocks both in-land and in the coastal areas also highlight that each perspective can take account of information that is not fully taken account of in the other. For the populist narrative, delays in decision-making and allegations of conflict

of interest in finalising the foreign companies both provide some form of credibility for the idea that bureaucratic red-tape is driven by self-interest. Traditional techno-economic studies might tend more towards highlighting barriers such as artificially low energy prices as credible reasons, without necessarily reaching conclusions about the underlying reasons that these barriers continue to exist. Lack of progress by the GoB in developing alternative sources is a cause for concern but the two perspectives present alternative factors that may explain it.

In general, it can be seen that techno-economic analysis tends to search for solutions to specific challenges with defined constraints. Arguably, the populist narrative is less subject to these constraints and as a result it is freer to propose possibilities outside of the scope of the techno-economic analysis, albeit with less regards to whether they can be technically realised. For example, in a Bangladesh context, allegations of corruption in setting up large infrastructural project are not uncommon[6]. It has been argued that many such decisions are made in Bangladesh based on non-policy aspects, as Governments may need political blessings from donors and external sources (Gardner,

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6 For example, in one occasion, a Canadian company paid bribe to one of the ministers in 2005 (see, http://www.cbc.ca/news/canada/calgary/calgary-s-niko-resources-to-pay-9-5m-bribery-fine-1.987297). In another incident, Chevron managed to pull out of Bangladesh and sold its business to another company after a major blowout on one gas field in Bangladesh – it is claimed that government officials and bureaucrats assisted Chevron in this regard (see http://www.theindependentbd.com/home/printnews/65637 and http://www.thedailystar.net/bad-deals-make-bangladesh-vulnerable-25087 for more details).

2012). This means that a populist narrative may contend that these inappropriate influences have dictated a course of action even when techno-economic analysis would not. As Aminuzzaman (2013:455) insists, the "political leadership of Bangladesh has treated some of the major policies more as rhetoric than commitment", and "the dynamics of public policymaking in Bangladesh … is either extensively influenced by donor conditions or external technical assistance".

Conclusions

In some cases, it appears that techno-economic analysis has not fully taken into account the populist narrative. Long-term planning is necessary to provide stability, find optimum pathways and attract investment. This needs to be balanced against potential for political change. It also needs process of periodic review as situation changes (e.g. different technologies and prices, different constraints such as the Paris agreement, different availability and pricing of fuels, environmental concerns brought to light, changing demand from population and industry).

It should be noted that the recommendations of techno-economic analysis are also be subjective (i.e. it is not just the political perspective). This is sometimes glossed over by the quantitative results that are presented (for any non-trivial system at least), but the quantitative results will still represent value-choices at some point in the underlying analysis. A key linkage between the two perspectives is that these value-choices could be highlighted more transparently and more explicitly linked to the politics of policymaking that dictates what they might be. For example, it may be agreed that protecting the Sundarbans is a worthwhile objective but it is still based upon a societal value choice. If the value of this objective were discounted then techno-economic analysis might suggest that the location for the Rampal Power Plant is appropriate

within the constraints adopted.

Techno-economic analysis can only ever be as good or appropriate as the constraints that it seeks to satisfy, whereas a political narrative can think bigger and even if some of the conclusions are subsequently shown to be ill-founded, it can move the discussion to what it needs to be. A technically feasible approach might be undermined because of political context and so rather than continuing with its recommendations regardless, it may be better to recognise that the technical challenges and the political challenges are both real and both need to be overcome in different ways (albeit with appreciation of the insights provided by the other perspective). On the one hand, the political perspective can be used to establish the aims, objectives and constraints of projects, as techno-economic analysis does not present tools that are adequate for this. On the other hand, the techno-economic analysis can determine the options and trade-offs that are likely to be encountered in pursuing these aims and that can then be evaluated in line with the priorities set according to a political framework. Effective locally appropriate policies have the potential to lift millions of people out of the misery of poverty and protect the environment. Clearly, policy problems are not purely technical matters. It requires careful political judgment about how to promote economic and social change in ways that stand the most chance of success (Addison, 2008:330). Competent technical analysis should not solely focus on technical matter but also consider assorted local contexts.

Recommendations

In some cases, key differences in conclusions can be partially explained by a lack of knowledge of each perspective by adherents of the other. Especially when both are

subject to change. Better communication of plans, updates to plans and the underlying reasons or justifications for them could help to resolve this. Care should be taken to communicate key points in a way that is appropriate to each audience. Therefore, it is contended in this paper that an effective policymaking model, taking local and national contexts into account, need to be open, accountable and humane.

In a country like Bangladesh where good governance is still far from an acceptable level, and politics are often associated with violence and corruption, the overall policy architecture needs to be improved so that it reconciles the technical and humane inputs from various social actors including civil society organisations. Structural change towards positive direction may take time but the desired principles are known – namely, transparency, accountability, along with putting national interest above political agenda or the interests of particular groups such as elites or national agents of multi-national companies. Great humility would be required in this process, along with the 'will to improve' (Li, 2007). If achieved, this could help to foster an environment in which the underlying (and sometimes hidden) assumption of each approach are better aligned and so there is a greater possibility of them presenting similar conclusions. Rather than adopting a simple combination of the approaches, it is better to recognise that both techno-economic and political analysis of populist narratives address different needs, potentially targeting different audiences. The perspectives should be used to complement and inform each other. Simply combining the two may mean losing the specific insights of each. The technical approach will focus on what can be done now and might ignore the aspirations for things to be much better that are found in populist view; both are needed but trying to combine them might lead to diluting both.

References

Addison, T. (2008), 'Development' in P. Burnell, and V. Randall (eds.), Politics in the Developing World' pp. 315 – 332, Oxford: Oxford University Press

Aminuzzaman, S. M. (2013), 'Dynamics of Public Policy: Determinants of Policymaking and Implementation in Bangladesh', Public Organization Review, Vol. 13, Issue 4, pp. 443 – 458

BankTrack (2015), Equator Principles Analysis of the Rampal Coal-Fired Powr Plant, Bangladesh, Executive Summary [online], Nijmegen, Netherlands: BankTrack

Belal, A. R. (2008), Corporate Social Responsibility Reporting in Developing Countries: the Case of Bangladesh, Hampshire: Ashgate

BPDB (2010) Power Sector Master Plan. Dhaka: Bangladesh Power Development Board. Available at: http://www.bpdb.gov.bd/download/PSMP/PSMP2010.pdf

BPDB (2015) Primary Grid map of Bangladesh (as of June 2015), Dhaka: Bangladesh Power Development Board. Available at: http://www.bpdb.gov.bd/download/Primary_grid_map_June-2015.pdf

BPDB (2016) Power Sector Master Plan. Dhaka: Bangladesh Power Development Board. Available at: http://powerdivision.portal.gov.bd/sites/default/files/files/powerdivision.portal.gov.bd/page/4f81bf4d_1180_4c53_b27c_8fa0eb11e2c1/PSMP2016%20(E)%20Summary%20(all%20chapters).pdf

BPDB (2017a), Bangladesh Power Development Board - Present Installed Generation Capacity (MW), Dhaka: Bangladesh Power Development Board. Available at: http://www.bpdb.gov.bd/bpdb/index.php?option=com_content&view=article&id=5&Itemid=6

BPDB (2017b), Daily Generation Archive, Available at: http://www.bpdb.gov.bd/bpdb/index.php?option=com_content&view=article&id=20&Itemid=18

Business Monitor International (BMI) (2016), Ten Emerging Markets Of The Future: Highlighting Key Sectors, BMI, July 2016

CEGIS (2013) Final report on Environmental Impact Assessment of 2x (500-660)MW Coal based thermal power plant to be constructed at the location of Khulna, Dhaka: Government of the People's Republic of Bangladesh / BPDB / Centre for Environment and Geographic Information Services. Available at: http://www.bpdb.gov.bd/bpdb/index.php?option=com_content&view=article&id=299

Clarke, R. (2002), 'Introduction' in C. Kirkpatrick (eds), Handbook on development policy and management, Cheltenham: Edward Elgar, pp. 1-11

Conteh, C., and Ohemeng, F. L. K. (2009) 'The politics of decision making in developing countries', Public Management Review, 11: 1, 57 — 77

Deacon, D. (2007), 'Yesterday's Papers and Today's Technology Digital Newspaper Archives and "Push Button" Content Analysis', European Journal of Communication, Vol. 22, No. 1, pp. 5 – 25

Devine, J. (2009), 'NGOs, Clientelism and the makings of social change', Journal of Bangladesh Studies, Vol. 11, No. 1, pp. 13-25

Devine, J. (2006), 'NGOs, Politics and Grassroots Mobilisation: Evidence from Bangladesh', Journal of South Asian Development, Vol. 1, No. 1, pp. 77 – 99

Doak, N., Murai, M., and Douvere, F. (2016), Report on the Mission to the Sundarbans World Heritage Site, Bangaldesh, from 22 to 28 March 2016, World Heritage Centre and International Union for the Conservation of Nature (IUCN). UNESCO. Available at: http://whc.unesco.org/en/documents/148097.

Financial Express, Bangladesh (2011) Available at: http://www.thefinancialexpressbd.com/more.php?news id=152970&date=2011-10-15

Gardner, K. (2012), Discordant Development Global Capitalism and the Struggle for Connection in Bangladesh, London: Pluto Press

Gastelum Lage, J. (2012), 'To what extent does social policy design address social problems? Evidence from the "70 y más" programme in Mexico', Development in Practice, Vol. 22, No. 7, pp. 1044-1056

Gomes, I. (2013), Natural Gas in Pakistan and Bangladesh: current issues and trends. Oxford, UK: Oxford Institute for Energy Studies Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2013/06/NG-77.pdf

Grindle, M. S., and John W. Thomas, J. W. (1998), 'Policy Makers, Policy Choices, and Policy Outcomes: The Political Economy of Reform in Developing Countries', Policy Sciences, Vol. 22, No. 3/4, pp. 213-248

Haas, P. M. (1992), 'Introduction: epistemic communities and international policy coordination', International Organization, Vol. 46, No, 1, , pp. 1-35

Hance, J. (2013) A Key Mangrove Forest Faces Major Threat from a Coal Plant by Jeremy Hance, 29 Oct 2013, Yale Environment 360, available at http://e360.yale.edu/feature/a_key_mangrove_forest_faces_major_threat_from_a_coal_plant/2704/

Hashemi, S. M. (1995), 'NGO accountability in Bangladesh: NGOs, state and donors' in M. Edwards and D. Hulme (eds), NGO Performance and Accountability: Beyond the Magic Bullet, London: Earthscan

Huq, S. (2017), Making the energy transition in Bangladesh and around the world, The daily Star, 14 February 2017

Imam, B. (2016), Bangladesh's near, short and long term state of fuel energy, The Daily Prothom Alo, 28 December.

Imam, B. (2017), How much is too much? Dependency on Imported Energy Source, The Daily Star, 10 January 2016, http://www.thedailystar.net/op-ed/how-much-too-much-199429

Islam, S. N. (2016), Governance for Development: Political and Administrative Reforms in Bangladesh, Basingstoke: Palgrave Macmillan

Kamruzzaman, P. (2014), Poverty Reduction Strategy in Bangladesh – rethinking participation in policymaking, Bristol: Policy Press

Keeley, J. and Scoones, I. (1999), Understanding Environmental Policy Processes: A review, IDS working paper 89, Environment Group, Sussex: Institute of

Development Studies

Khan, M. (2013), 'Bangladesh: Economic Growth in a Vulnerable Limited Access Order' In: North, Douglass and Wallis, John and Webb, Steven and Weingast, Barry, (eds.), In the Shadow of Violence: Politics, Economics and the Problems of Development, Cambridge: Cambridge University Press, pp. 24-69.

Lewis, D. (2018, in press), 'Peopling policy processes? Methodological populism in the Bangladesh health and education sectors,' World Development, Vol. 108, pp. 16-27

Lewis, D. (2011), Bangladesh: Politics, Economy and Civil Society, New York: Cambridge University Press

Li, T. M. (2007), The will to improve: Governmentality, development, and the practice of politics, Durham: Duke University Press

Mooij, J. (2007), 'Is There an Indian Policy Process? An Investigation into Two Social Policy Processes', Social Policy Administration, Vol. 41, No.4, pp 323-338

Mosse, D., and Lewis, D. (2006), 'Theoretical approaches to brokerage and translation in development' Chapter 1, In D. Lewis & D. Mosse (Eds.), Development brokers and translators: The ethnography of aid and agencies, Bloomfield CT: Kumarian Press.

Muhammad, A. (2016) Everybody's Responsibility for Sundarban, Prothom-Alo, 28 November 2016

Oliver, P. E., Cadena-Roe, J., and Strawn, K. D. (2004), Future trends in the study of social movements and collective behavior, in B. A. Dobratz, T. Buzzell,&L.

K.Waldner (Eds.), Political sociology for the 21st century: Research on political sociology, Stanford: Jai Press, Inc.

Prothom-Alo (2016a) Editorial, 3 December 2016

Prothom-Alo (2016b), Fuel sector has become standstill (Thomke Achey Jwalani Khat), 13 November

Prothom Alo (2017), Seven Years of Movement from Protecting the Sundarbans (Sundarban Rokhkha Andoloner Sat Bochor), 02 January

Prothom Alo (2018), 190 Industrial units around the Sundarbans (Sundarbaner Charpashey 190 Shilpo-protishthan), 06 April

Rahman, Mustafizur (2012), Sustainable Exploitation of Bangladesh's Coal Resources: An Intractable (?) Policy-dilemma, European Report on Development (https://ec.europa.eu/europeaid/sites/devco/files/erd-consca-dev-researchpapers-rahman-20110101_en.pdf)

Rahman, Mushfiqur (2014), Primary Energy Supply Challenges for Power, The Daily Star, 1 January 2014, http://www.thedailystar.net/primary-energy-supply-challenges-for-power-4874

Rahman, Mowdud (2017), Sundarbans: World's Largest Mangrove Forest at Stake, Green Peace India, http://www.greenpeace.org/india/en/Blog/Guest-blog/sundarbans-worlds-largest-mangrove-forest-at-stake/blog/58575/

Rahman, Md. Mizanur (n.d.) Bangladesh National Conservation Strategy – Power Sector. Available at: http://fd.portal.gov.bd/sites/default/files/files/fd.portal.gov.bd/notices/c3379d22_e

e62_4dec_9e29_75171074d885/19.%20Power_NCS.pdf

Rashid, A. K. (2014) The role of the bureaucracy in policymaking in Bangladesh, Asia Pacific Journal of Public Administration, Vol. 36, No. 2, pp. 150-161

Robson, C. (1993), Real world research, Oxford: Blackwell

Sajjad, M. and Rasul, M. G. (2015), 'Prospect of Underground Coal Gastification in Bangladesh', Procedia Engineering, Vol. 105, pp. 537-548.

Sharda, J. and Buckley, T. (2016), Risky and Over-subsidised: A Financial Analysis of the Rampal Power Plant, Institute for Energy Economics and Financial Analysis (IEEFA)

South Asians for Human Rights (2015), Report to the Fact Finding Mission to Rampal, Bangladesh, Colombo: SAHR, retrieved from http://www.southasianrights.org/wp-content/uploads/2015/09/Report-of-the-FFM-Rampa-Bangladesh.pdf

Stirling, A. (2010). Keep it complex. *Nature*, *468*, 1031.

Sultana, M. (2016), 'Power and energy; potentials, crisis and planning' in A Riaz and M S Rahman (eds), Routledge Handbook of Contemporary Bangladesh, pp. 245-258, Oxon: Routledge

Sutton, R. (1999), The Policy Process: an overview, London: Overseas Development Institute

The Daily Star (2016), Rampal Power Plant: Protest in India too, 19 October, http://www.thedailystar.net/backpage/rampal-power-plant-protest-india-too-

1300690

The Daily Star (2017), Rampal Plant Pollution Impact: Greenpeace Study Shows Grim Picture, 06 May, http://www.thedailystar.net/frontpage/6000-premature-deaths-40yrs-1401421

The Daily Star (2018), Licence to harm Sundarbans, 06 April, https://www.thedailystar.net/frontpage/licence-harm-sundarbans-1558918

Uddin, S. N. & Taplin, R. (2008), Toward Sustainable Energy Development in Bangladesh. The Journal of Environment & Development, 17(3) 292-315

Uddin, S. (2016), Bangladesh is building a dirty and expensive coal plant next to the world's largest mangrove forest, The Conversation, 27 September

Van Schendel, W. (2009), A History of Bangladesh, Cambridge: Cambridge University Press

Vigar, G., Healey, P. (2002), 'Environmentally respectful planning. Five key principles', Journal of Environmental Planning and Management, Vol. 45, Issue 4, pp. 517–532.

Werner, W. J. (2009), 'Corporate Social Responsibility Initiatives Addressing Social Exclusion in Bangladesh', Journal of Health Population and Nutrition, 27(4): 545–562

Whitfield, L. and Buur, L. (2014), 'The politics of industrial policy: ruling elites and their alliances', Third World Quarterly, Vol. 35, No. 1, pp. 126-144

Wolsink, M. (2007), 'Planning of renewables schemes: Deliberative and fair decision-

making on landscape issues instead of reproachful accusations of non-cooperation', Energy Policy, Vol. 35, No.1, pp. 2692–2704

Wood, G. (1994), Bangladesh: Whose Ideas, Whose Interest?, London: Practical Action Publishing

World Bank (2017), Bangladesh [online], retrieved from http://data.worldbank.org/country/bangladesh (accessed on 17 July 2017)

World Bank (2017a) Commodity prices. Available at: http://www.worldbank.org/en/research/commodity-markets (accessed 04/04/2017)

Table 1: Power generation capacity in Bangladesh. Adapted from BPDB (2010, 2017a)

	2011 Generation Capacity (MW)	2017 Generation Capacity (MW)
Public Sector	3481	7138
QRPP	250	
Other rentals (3 – 15yr)	609	2038
Other private sector	1596	3375
Imports		600

Figure 1: Stylised power generation daily profile (based upon BPDB 2017b for end of 2016)

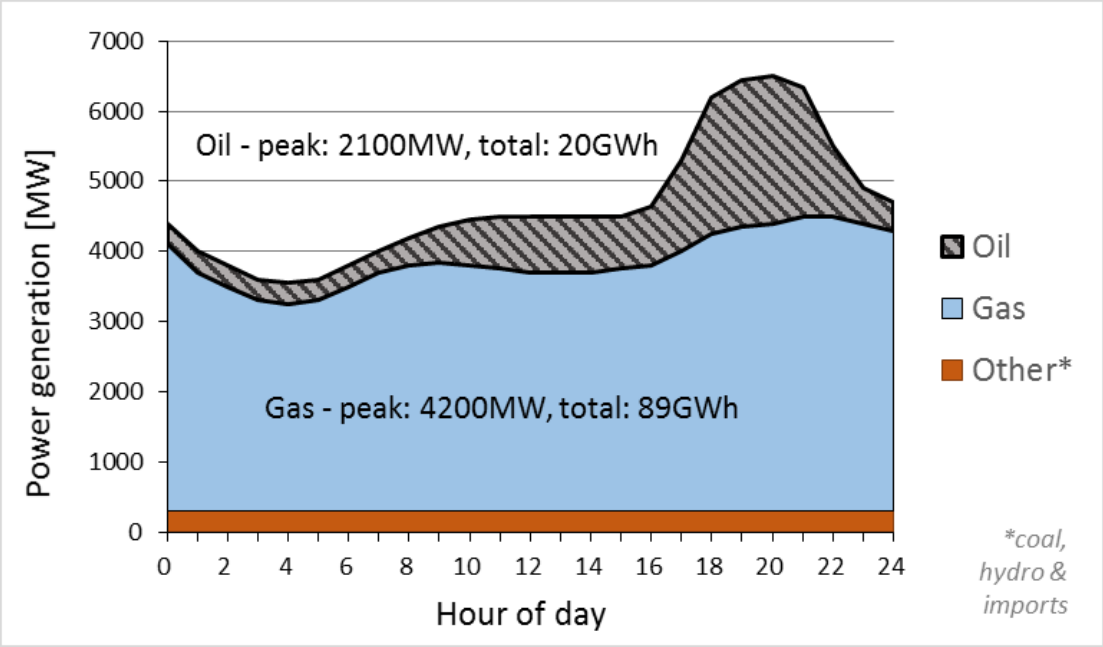

Figure 2: Comparison between coal and gas fuel price projections (based on World Bank, 2017a)